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CONTRACTILE RESERVE ASSESSED BY THREE-DIMENSIONAL GLOBAL CIRCUMFERENTIAL STRAIN AS A PREDICTOR OF LONG-TERM OUTCOME IN PATIENTS WITH IDIOPATHIC DILATED CARDIOMYOPATHY

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Background: Two-dimensional global circumferential strain (GCS) from mid-left ventricular short-axis view has been reported as a powerful predictor of cardiac events and appeared to be a better parameter than ejection fraction in heart failure patients. However, this technique is limited to two-dimensional tomographic imaging planes, which may oversimplify the complexities of left ventricular function. On the other hand, novel three-dimensional (3-D) speckle-tracking system can quantify 3 different strains simultaneously from all 16 left ventricular segments. Accordingly, our objective was to investigate the ability of GCS with dobutamine stress using 3-D speckle-tracking to predict cardiac events in heart failure patients with idiopathic dilated cardiomyopathy (IDC).

Methods: We prospectively recruited 41 consecutive IDC patients with ejection fraction of 35±8%. We measured GCS, global radial (GRS), and longitudinal (GLS) strains using 3-D speckle-tracking echocardiography at baseline and during dobutamine infusion (20μg/kg/min). Event-free survival was pre-specified as primary end points of death from worsening heart failure, hospitalization for deteriorating heart failure, and was tracked over 10.1-months.

Results: The primary endpoint occurred in 7 (17%) of patients. Of individual measures, the increase in 3-D GCS with dobutamine stress (ΔGCS) >2.43% was the best predictor of cardiac events with sensitivity of 86%, specificity of 88%, and the area under the curve of 0.94 ($p<0.001$). In multivariate Cox proportional hazard model, ΔGCS was the only independent predictor of cardiac events (hazard ratio: 0.489, 95% confidential interval: 0.319-0.749, $p<0.001$). Furthermore, patients with ΔGCS>2.43% had a significantly better prognosis than those with ΔGCS≤2.43% (Log rank $p<0.001$).

Conclusion: In conclusions, 3-D GCS with dobutamine stress would have potential to predict cardiac events in heart failure patients with IDC. These observations may have clinical implications for management of such patients.